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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Ex Parte

Via Hand Delivery

Merrill Spiegel
Federal Communications Commission
1919 M Street, N.W.
Room 222
Washington, D.C. 20554

Re: **MM Docket Nos. 92-266, 93-215**

Dear Mr. Caton:

As promised December 23, 1993, enclosed herewith are the Continental items I mentioned.

The first item is entitled "The Effects of Adding Addressability to the FCC's Cable TV Benchmark Regression Model." It was initially attached as an Appendix to the Comments of Continental Cablevision, Inc., filed on August 25, 1993. It recommends adding an "addressability" factor to the Commission's benchmark fomula.
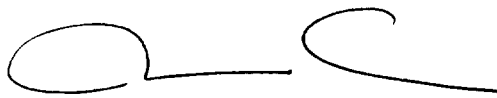
The second item is entitled "Channel Additions Involving Capital Expenditures Should Result in an Upgrade Adjustment." It is an excerpt from Continental's Comments on the Third Notice of Proposed Rulemaking, filed on September 30, 1993. It observes that channel capacity upgrades generally will not be cost-justified under the existing benchmark methodology. Continental suggests, therefore, adding a streamlined cost-of-service upgrade surcharge to the general benchmark fomula. The surcharge would be based upon the total

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capital invested in the upgrade, divided by the life of the investment and the number of channels and subscribers affected. Continental suggests that the resulting per channel, per subscriber surcharge be "capped" so that when it is added to the benchmark formula, the resulting per channel rate is no higher than the original per channel rate.

If you have any questions, please contact the undersigned.

Respectfully submitted,

Paul Glist

cc: William F. Caton, Secretary (Ex Parte)

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Appendix 2

The Effects of
Adding Addressability to the FCC's
Cable TV Benchmark Regression Model

David J. Roddy[1]

Summary

The Commission erred in its statistical analysis by not including addressability in the regression models which created the Form 393 benchmark tables which are part of the implementation of the Cable Act of 1992. This error can, and should, be corrected before the benchmarks are implemented. Accounting for addressability in the regression equation used in FCC's the cable television rate benchmarks improves the statistical results of the model and should have been tested in the stepwise regression technique which the Commission used. This modification would improve the basic FCC formulation while allowing for adjustments generally based on costs.

We included addressability in the model using the Commission's own data without modification. The results show that it is statistically significant and it indicates that systems with higher addressability have higher prices per channel. Rather than propose a completely new set of benchmark tables based on a new regression model, we can correct for the Commission's error and still use the original benchmark tables and forms. We do this by estimating a supplementary regression which produces a table of values which are to be added to the benchmark values before they are inserted into Lines 121 and 220. The value to be added varies from 0-cents for a system with 0-percent addressability to 7.4 cents for a system with 100 percent addressability.

Introduction

The Commission's benchmark formula is shown in Appendix E of the May 3, 1993 *Report and Order* on cable rate regulation, as:

(1)   LNP = 2.4448 + 7.3452 (RECIPSUB) - 0.8878 (LNCHAN) + 0.1006
(LNSAT) - 0.0939 (ABC)

where:

LNP   = natural logarithm of the benchmark rate per channel;
ABC   = 1 if the community unit belongs to one of the categories
                comprising the statutory definition of "effective competition"
                otherwise 0;
RECIPSUB   = 1 / number of households subscribing to the cable system;

---

1. Vice President and Senior Economist, Economics and Technology, Inc., One Washington Mall, Boston, Massachusetts 02108, Ph.D., Economics, University of Wisconsin, Madison.

1

LNCHAN = natural logarithm of the number of channel in use in all regulated tiers of service;

LNSAT = natural logarithm of the number of satellite-delivered channels on all tiers of service.

The Adjusted R Squared of the model is **0.628** and the number of observations is 377. This regression model is described at paragraphs 25 through 34 of Appendix E of the May 3, 1993 Order. The Commission used this regression model to create all of the Benchmark Tables used in Part II of Form 393.[2]

Omitting variables which should be entered in a regression causes serious problems in the model and the validity of its results. Such an omission biases the results of the regression model.[3] The Commission has noted the possibility that important variables which legitimately affect both cost and price might appropriately be added to the regression model in order to improve its accuracy.[4]

One such variable is the addressability of the individual system. Addressability is the addition of functionality to the cable system allowing the operator to implement specific service features at individual subscriber locations or addresses. Addressability requires added capital investment in cable headend, distribution and customer premises equipment. These costs may be incurred over several years as systems are upgraded from older technology to addressable technology. We would expect that systems with higher addressability would have higher costs and hence higher prices per channel. If such a variable is omitted from the model, the effect is to penalize systems with high addressability.[5]

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2. In its July 30, 1993 release of Form 393 to be used with cable rate submissions, the Commission eliminates the ABC variable and subtracts .0939 from the Appendix E constant term of 2.4448. This produces a constant term of 2.3509 in the Form 393. Both methods produce identical results.

3. Any number of standard texts, such as Greene, William H., *Econometric Analysis*, New York, NY: MacMillan Publishing Company, 1990; Theil, Henri, *Principles of Econometrics*, New York, NY: John Wiley & Sons, 1971; and Wonnacott, Ronald J. and Wonnacott, Thomas H., *Econometrics, Second Edition*, New York, NY: John Wiley & Sons, 1979 would support this principle.

4. This possibility is reflected in paragraph 72 of the July 15, 1993 *Notice of Proposed Rulemaking* on cost of service standards for the cable industry (MM Docket 93-215), where the Commission noted that, "Operators who could demonstrate the existence of such factors might then be permitted to charge rates equal to the benchmark plus an 'add-on' amount attributable to those extraordinary factors."

5. The Commission equipment basket cost rules, in Part III of Form 393, allow cable operators to differentiate the costs of addressable and nonaddressable subscriber converters. This feature, however, does not actually *recognize* the costs of addressability, because the gross costs associated with converters and other cable equipment are simply deducted from Part II of the form used to calculate benchmarks. The adjustment proposed here, then, does not require any change in the Part III equipment costing process.

Corrected stepwise regression results show the error of excluding addressability

We tested to see whether the percentage of addressable subscribers in the systems in the Commission's sample would have a statistically significant effect on price. This variable is readily available in the FCC data released to the public.[6] We define the percent addressable as:

(2)　　　　**PADDRES = 100 times (number of addressable subscribers / number of households subscribing).**

We calculate the variable from the Commission's database of 377 systems as 100 times S2_ASUBS divided by S2_HHSUB.[7]

In the next step of the analysis, we duplicate the stepwise regression procedure that the Commission stated that it used in paragraph 26 of Appendix E with the same SPSS software that the Commission used. In brief, stepwise regression "automatically" selects variables to be used in the model based on their importance in explaining the variation of prices per channel in the sample. The researcher's role is to specify a group of variables, such as number of channels, subscribers, satellite channels, to be considered for addition to the model. In our analysis, we allow addressability to enter as well as all of the Commission's variables specified in (1) above.

Our stepwise regression results showed clearly that addressability entered the model in a statistically significant manner. In fact, it was the second most important variable to be entered after the number of channels. The t statistic on percent addressability is **3.72** which, since it is greater than 1.96, indicates a highly significant and relevant variable. The Adjusted R Squared from this new model is **0.636** -- greater than that for the Commission's Appendix E model shown in (1) above.[8]

Thus, we have used the Commission's data without modification, the same software, and the same regression modeling technique. We allowed addressability to be added to the model and it was automatically selected by the computer software as one of the most significant variables to enter the model. We conclude that addition of the percent addressability to the model was not tested by FCC, despite the fact that it was one of the first items asked for in its cable system

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6. We used the revised database designated as "CABLERE2.EXE" and dated June 11, 1993. With this database and using SPSS software, we duplicated the Commission's Appendix E statistical results exactly.

7. The references are shown in FCC's "Release of Data from Cable TV System Operators Rate Structure Questionnaire," February 24, 1993, Schedule 2.

8. All of the other variables are also statistically significant as well.

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questionnaire. If the FCC had allowed the software to consider adding this variable, it would have achieved identical results to ours.

The "Benchmark Plus" model

It is clear that addressability has an important effect on cost and hence price. In order to implement the add-on effect of addressability and preserve the many forms that the Commission has already created, we adopt a "supplementary regression" approach.

In this approach, we take the residuals of the Commission's equation in (1) and use those as the dependent variable in a regression on addressability. This econometric procedure is in the class of constrained estimators. It minimizes the sum of the squared residuals of the full model (including addressability) subject to the constraint that the parameters of the Commission's model, in Appendix E of the *Report and Order*, cannot change. The residuals are the "unexplained" part of the model, i.e., that portion of price variation which cannot be predicted using the variables already in the model. We are thus attempting to determine whether or not addressability can help further explain the variation in price per channel in the Commission's sample of 377 systems. If addressability can help explain the residuals then it is clearly a factor that will improve the model, and, given the stepwise regression results reported above, one should expect that it will be a statistically important variable.

The results of this supplementary regression model are:[9]

(3)   RESID = 0.0009 (PADDRES)

where

RESID   = unexplained part (residuals) from the FCC model in (1) above.

The t statistic on percent addressability is 2.81. Since the t statistic is greater than 1.96, we conclude that addressability is an important omitted variable and that it definitely has a statistically significant effect on price. It is thus obvious that addressability is a reasonable and important "add on" amount which affects both cost and price per channel. This is exactly consistent with the results of the stepwise regression which we reported in the previous section. The supplemental model also shows that addressability meets not only the standard statistical tests discussed above but also the intent of the Commission regarding additional factors which would justify rates higher than the benchmark tables.[10]

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9.   We omit a constant term here because there is already a constant term in the model in (1) above.

10.   See footnote 4 above.

We convert the 0.0009 coefficient into a table showing the additive amount (in cents) for various levels of addressability. Since the coefficient relates to natural logarithms, we compute the effect at the mean of the Commission's sample of 377. This provides a straightforward implementation procedure with a very simple table (below).[11] The formula used to create the table is:

(4)   ADD-ON VALUE = exp (0.0009 PADDRES - 0.244) - exp (- 0.244)

where

ADD-ON VALUE   = add on value in cents per channel;
exp   = 2.718 raised to the power.

and -.244 is the mean of the natural logarithm of price per channel in the Commission's sample.[12] This add-on value is thus the difference between the model which considers addressability and the Commission's model which does not consider it. Note that the exp operator is required to convert from natural logarithm values used by the Commission in model (1) above.

The add-on formula shows that the add-on value depends on the extent of addressability in the given system. A system with 0 percent addressability yields a 0 cents per channel add on value. In contrast, a system with 100 percent addressability yields an add-on value of 7.4-cents per channel.

Procedure to implement the Benchmark Plus model

One can correct the Commission's error by first using the existing benchmark tables (or formula) and finding the appropriate value as instructed in Form 393. Then, before entering the value in Lines 121 and Line 220, add the applicable amount from the table below, depending on the percent addressability of the system. Interpolation between the different data points on this table should be accomplished following the general method discussed in the Commission's instructions in Attachment A to the benchmark tables, item 3. This combination can be referred to as the corrected benchmark value. After this calculation has been made, the corrected benchmark value would be entered in Lines 121 and Line 220 in Form 393 and the remainder of the form would be completed pursuant to the existing rules and instructions.

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11.   In principle, one could create a different "add-on" effect for systems with different numbers of subscribers and channels. Our procedure cures the Commission's problem with a minimum of additional calculations required by the Commission and the cable system operator.

12.   This value corresponds with a mean cents per channel of 78.3 cents.

**Amount to be Added to FCC Benchmarks
To Account for Percent Addressability**

Percent of Subscribers Who Are Addressable	Amount Per Channel to Add to Benchmark
Value	
0	$0.000
10	$0.007
20	$0.014
30	$0.021
40	$0.029
50	$0.036
60	$0.043
70	$0.051
80	$0.058
90	$0.066
100	$0.074

Source: FCC Cable Operator June 11
Database, and ETI Regression Model

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from any local advertising sales will simply force more cost pressures onto subscriber rates.

B. Channel Additions Involving Capital
    Expenditures Should Result in an
    Upgrade Adjustment

Continental believes the Commission is appropriately concerned with developing streamlined approaches to cost-of-service showings, expecially in those instances where technical upgrades and rebuilds will expand consumer choices. As the Commission has recognized, the existing benchmark methodology fails to account for channel additions undertaken as a result of system upgrades.[4] As an example, an upgrade from 450MHz to 550 MHz would produce a significant shortfall under the Commission's formula, as shown in the following Exhibit. Under this example, the benchmarks produce only $0.93 per subscriber for an upgrade requiring $2.11 per subscriber to cover depreciation and an 11.25% return.

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[4] A "system upgrade" in this context is any channel addition that is accomplished by expending capital funds to upgrade the capacity of the system, as opposed to simply activating channels on existing "spare" capacity.

EXHIBIT A:

REPRESENTATIVE UPGRADE ANALYSIS

		Col. A Pre-Upgrade	Col. B Post-Upgrade
1	Total Activated Channels	60	77
2	Regulated Channels	45	55
3	Satellite Channels	30	40
4	Unregulated Channels	15	22
5	Regulated Channels (%)		71.43%
6	Subscribers		20,000
7	Capital Required for Upgrade		$3,420,000
8	Capital Attributable to Regulated Channels [Line 7*Line 5]		$2,442,857
9	New "Regulated" Capital/Subscriber [Line 8/Line 6]		$122
10	Franchise Life (Years Remaining)		10
11	Overall Return on Rate Base		11.25%
12	Annual Depreciation/Subscriber [Line 9/Line 10]		$12.21
13	First Year Return on New Investment/Subscriber [(Line 9 - 0.5*Line 12)*Line 11]		$13.05
14	**TOTAL FIRST YEAR CAPITAL COSTS FOR NEW INVESTMENT/SUBSCRIBER**		$25.27
15	Maximum Permitted Rate/Channel/Month/Subscriber (Benchmark Formula)	$0.5035	$0.4337
16	Number of Regulated Channels [Line 2]	45	55
17	Unadjusted Monthly Revenue/Subscriber [Line 15*Line 16]	$22.66	$23.85
18	Programming Cost/Channel/Subscriber/Month	$0.1119	$0.1119
19	Programming Cost/Subscriber/Month [Line 18*Line 16]	$5.04	$6.15
20	Monthly Non-Programming Revenues/Subscriber [Line 17-Line 19]	$17.62	$17.70
21	Annual Non-Programming Revenues/Subscriber [Line 20*12]	$211.48	$212.41
22	Annual Revenues/Subscriber Available for Upgrade costs w/o Upgrade Charge [Line 21 Col. B-Line 21 Col. A]		$0.93
23	First Year Capital Costs for New Investment/Subscriber [Line 14]		$25.27
24	First-year Capital Costs/Subscriber/Month [Line 23/12]		$2.11
25	First Year Capital Costs/Subscriber/Channel/Month (UPGRADE CHARGE) [Line 24/Line 2]		$0.0383
26	UNADJUSTED MAXIMUM PERMITTED RATE [Line 15]		$0.4337
27	ADJUSTED MAXIMUM PERMITTED RATE/MONTH [Line 25+Line 26]		$0.4720

NOTES:

1. The figures in this chart are based on a plant upgrade from 450 MHz to 550 MHz, using costs developed for Continental's internal budgeting and forecasting purposes.

2. The monthly programming costs per subscriber per channel in the pre-upgrade system bear the same relationship to the maximum permitted charge as is reflected in the example contained in Note 252 of the Third Notice of Proposed Rulemaking. It is assumed that the per-channel monthly programming costs remain unchanged after the upgrade.

3. As the invested capital is depreciated over the ten-year franchise life, the return requirement will decline. This effect can be dealt with in one of two ways. First, the upgrade charge could be recalculated each year to reflect the lower undepreciated capital balance. Second, the charge could be "levelized" so that it would not change over the 10-year period.

Unless cable operators have reasonable means to recover the costs of upgrades under the benchmark system, however, upgrades will only be made if the system operator is prepared to undertake a full-blown cost-of-service showing. This will inevitably have a chilling effect on decisions to upgrade systems at a time when investment in communications infrastructure is both needed and desired.

Continental believes it would be practical to allow operators to make a highly abbreviated showing of incremental upgrade costs when adding channels in connection with a system upgrade. This abbreviated cost showing would allow the calculation of an "upgrade charge" to be added to the benchmark rates in effect before the upgrade. The purpose of this "upgrade charge" would be to allow the cable operator to be made whole, in regulated rates, for the costs of system upgrades that might not be fully reflected in the benchmark formula.

Continental proposes that the new per-channel per-subscriber rates in the case of an upgrade be calculated in two steps. First, the operator would calculate the rates that would apply under Continental's proposed formula (as discussed in Section III.A. above). Second, the per-channel per-subscriber cost of the upgrade would be added -- up to a limit -- to those rates to reflect the unique costs of the upgrade itself.

The cost of the upgrade would be determined using the following factors:

(a) the amount of capital (and capitalized interest and expenses) involved in an upgrade;[5]

(b) the remaining life of the franchise or the expected economic life of the new investment, whichever is shorter;

(c) the new (post-upgrade) number of activated channels on the system; and

(d) the number of subscribers to basic and satellite tier services.

The calculation would be as follows:

Using the capital invested (a) and the expected life of the upgrade (b), the operator would calculate a total annual capital cost of the upgrade. (A return on investment would be calculated using the rate of return established by the Commission for cost-of-service showings). This annual capital cost would be converted to a monthly amount, then divided by the number of channels (c), and, again, by the number of subscribers (d).[6] This would result in a per-channel per-subscriber monthly

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5/ The capitalized expenses might include, for example, the extraordinary maintenance costs often incurred during the temporary period that both the old and new systems are "up and running" immediately prior to the full cut-over to the new system.

6/ This figure could be adjusted to reflect the fact that fewer than all customers subscribe to the CPS tier, as discussed in Section III.A. above, if the upgrade does not affect quality of basic service.

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"upgrade" charge. The exhibit illustrates how this charge would be calculated. In the example, an additional $0.0383 would be added to the benchmark rate.

Under Continental's proposal, operators would have the option of making this streamlined cost-of-service showing in connection with any voluntary upgrade involving expenditure of capital. This showing would not depend upon whether the upgrade was part of a franchise agreement or was separately approved by the franchising authority. However, as a cross-check on the reasonableness of upgrade investments which are not required by franchise, Continental suggests that only upgrades resulting in economies of scale would be entitled to this recommended streamlined treatment under benchmark regulation. Thus, the streamlined cost-of-service showing would only be available for voluntary upgrades to justify final per-channel per-subscriber rates that are _lower_ than pre-upgrade per-channel per-subscriber rates. If an operator believes that the circumstances of a particular upgrade justify an _increase_ in per-channel per-subscriber rates, a full cost-of-service showing would be required.

IV. THE COMMISSION SHOULD ALLOW AN ADJUSTMENT TO
     BENCHMARK RATES TO REFLECT THE COST OF UPGRADES
     REQUIRED BY FRANCHISING AUTHORITIES

Finally, Continental submits that the Commission should allow cable operators "external cost" treatment to reflect the

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